MDA/SMC
Ocean Sonic Boom Program
Overview

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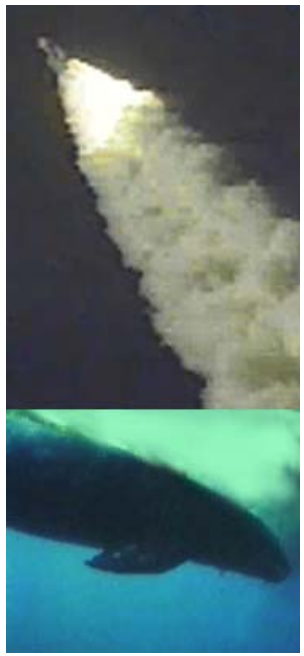
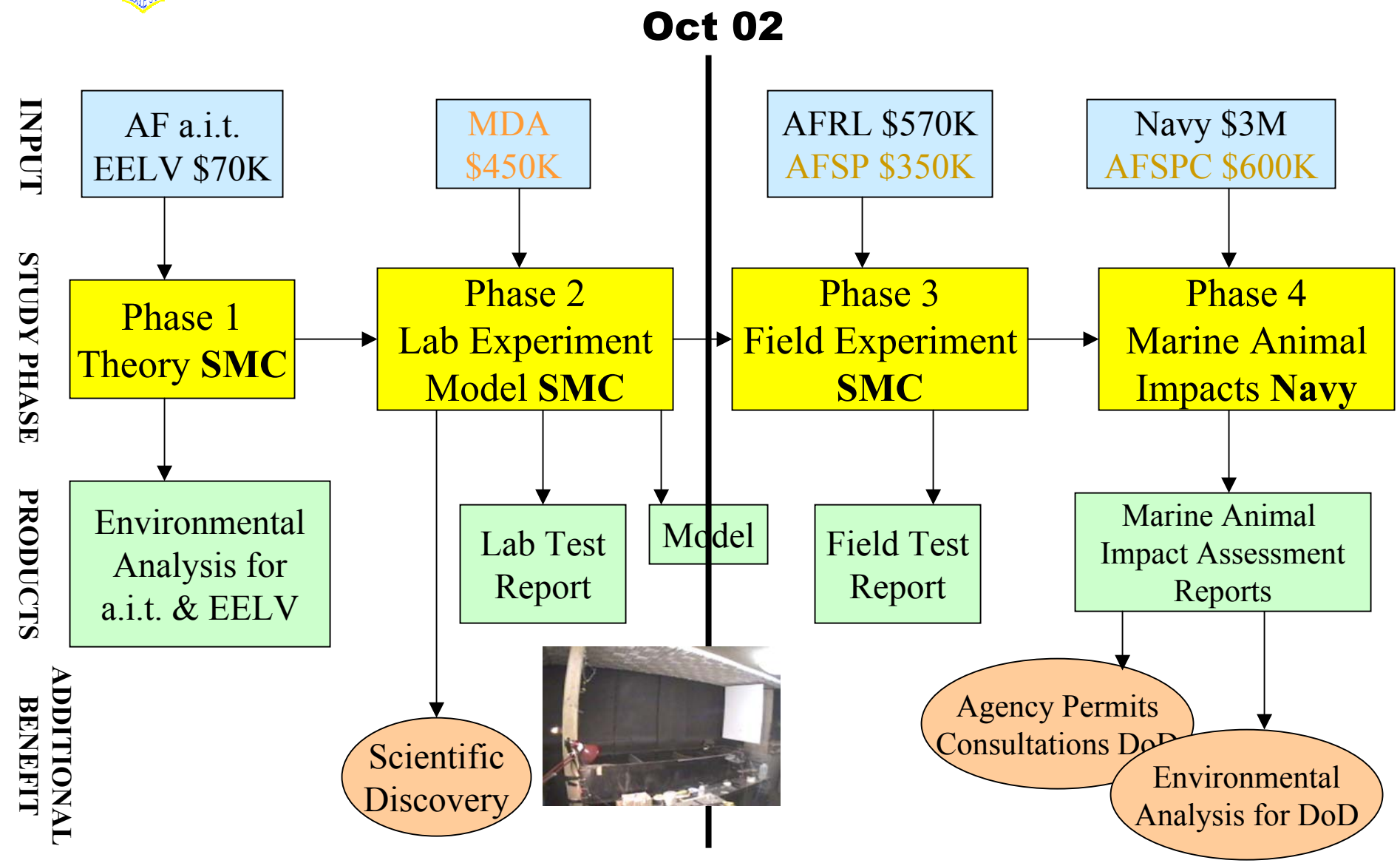
MDA/SMC Ocean Sonic Boom

- **Provide** a predictive model for use in permits and environmental impact documents, of sonic boom interaction with ocean surface waves and resulting promotion of underwater propagation.
- **MDA funds** supported laboratory experiments
- **GENERAL: Launch Sonic Booms Underwater Effects are Unknown**
  - Underwater propagation of noise new and serious issue with many environmental groups
  - SMC, Navy and MDA proactively seeking to understand impacts on marine animals
  - Developed new underwater propagation theory in ait and EELV
- **PROJECT: Sonic Boom Underwater Penetration**
  - Experiment to test validity of Theory by Dr. H.K. Cheng & Dr. C.J. Lee "Strong Effect of Water Waves on the underwater acoustical signals received at depth during the passage of sonic booms".



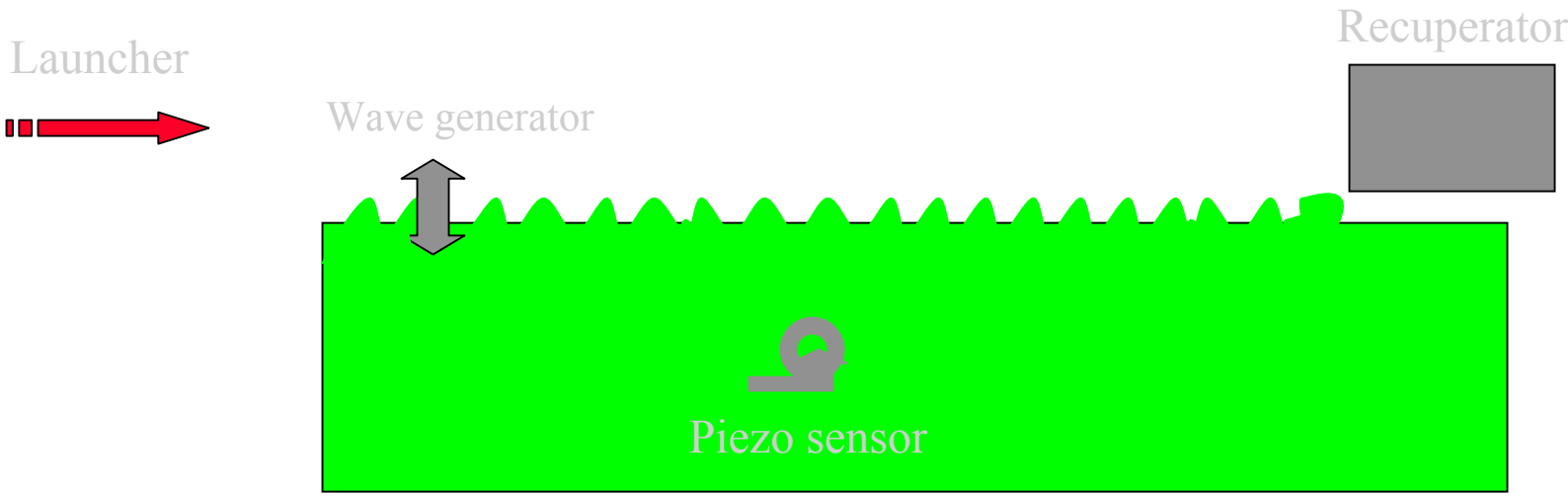
Ocean Sonic Boom Program



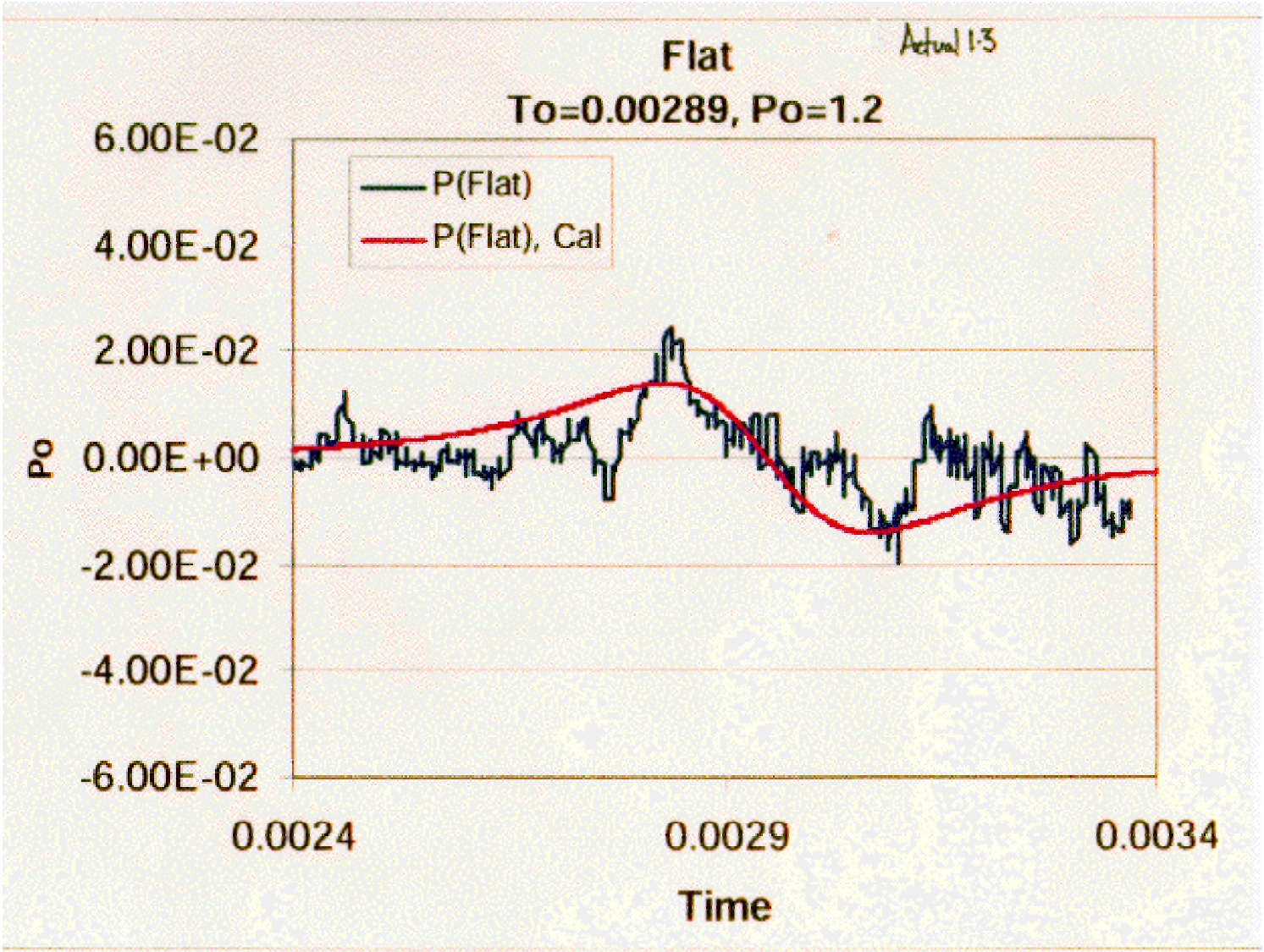
MDA/SMC Sonic Boom

- **Schedule/Key Activities**
  - Apr 02 - Final Experimental Results Report
  - Jan 03 - Multimedia Presentation
  - Jan 03 - Final Underwater Computer Model
  - APR 03 -Model Integration with PC Boom 4
  - July 03 – Model Field Test
  - Jan 04 – Impacts on Marine Animals
- **Previous Accomplishments**
  - Developed Experimental Plan
  - Built Experimental Facilities
  - Ran screening tests
  - Results of Screening tests validates the theory
  - Issued Final Experimental Results Report
- **Results**
  - The experiment gives pressure traces that are qualitatively similar to the theory / numerics.
  - There is indication that this is true for quantitative level as well
  - Results to be input to joint AF/NAVY/MDA programs to Understand Potential Impacts on marine animals

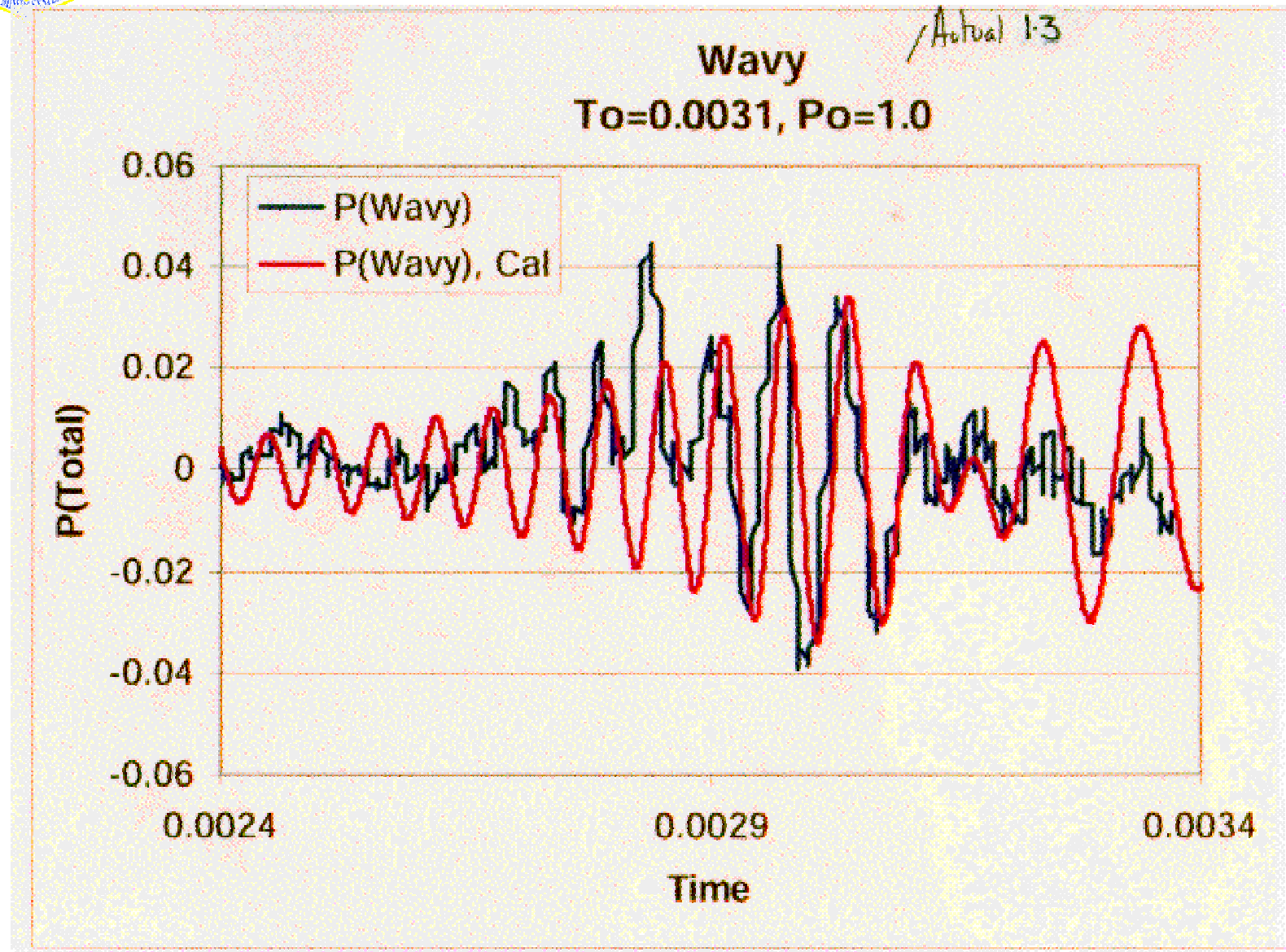
Experimental setup



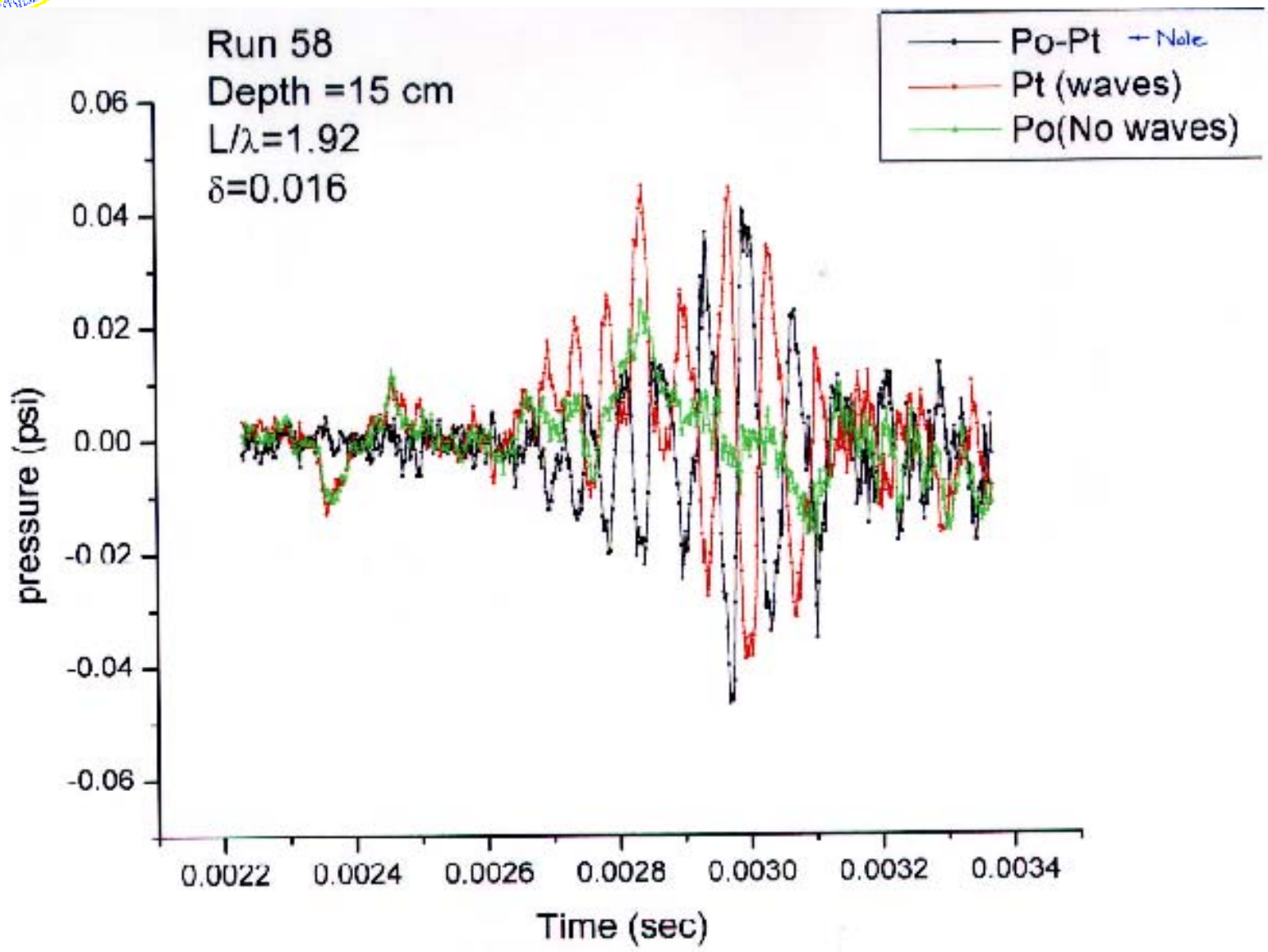
Predicted vs Measured Flat Ocean



Predicted vs Measured Wavy Ocean

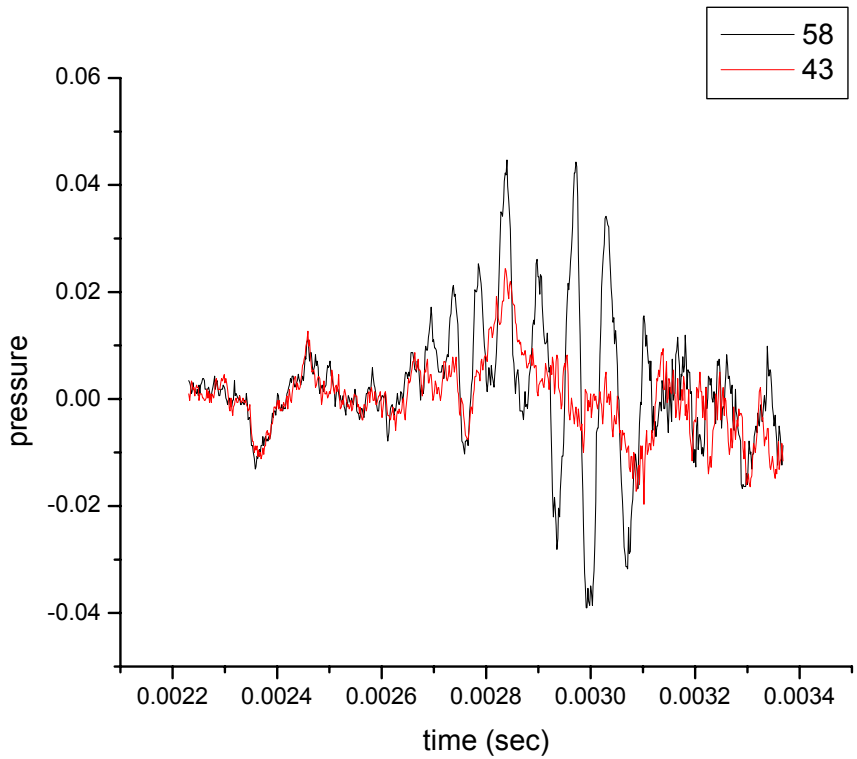


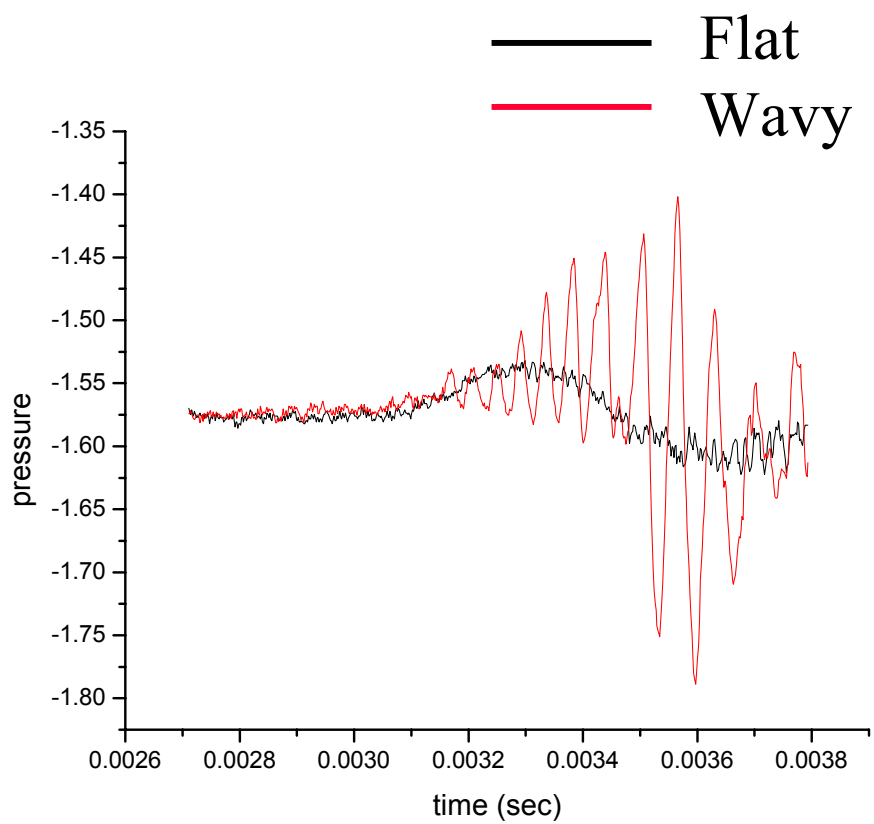
Flat vs Wavy Results 15cm



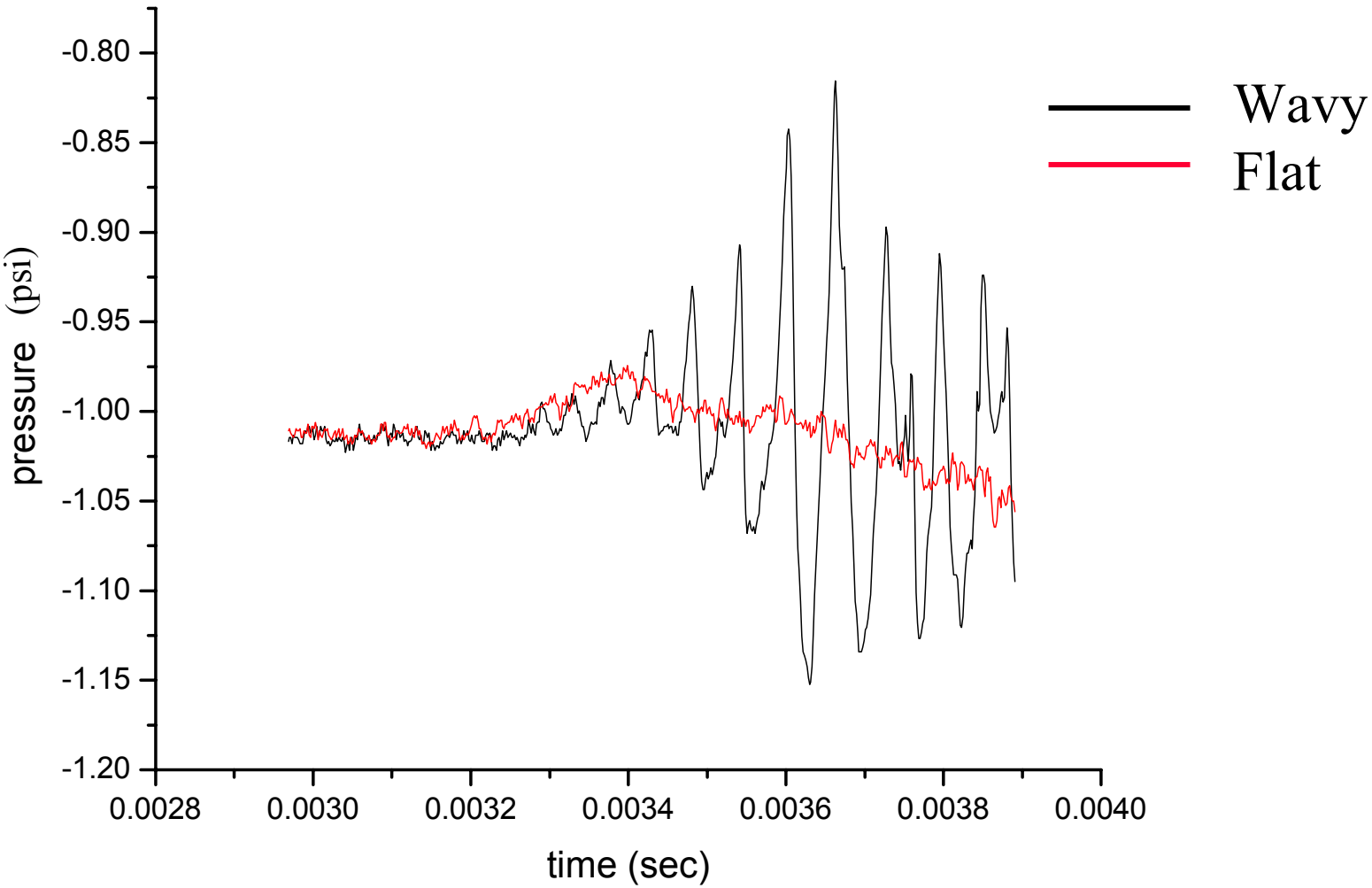
Old vs New data series d=15cm

for relatively receptive conditions





Flat vs Wavy Surface 22cm, M=2



Ocean Sonic Boom Model

- Ocean Sonic boom program Phase 2 includes lab experiments & development of computer model
- Report on experiments and model are available at http://ax.losangeles.af.mil/axf
- Model predicts underwater pressure from sonic booms under Wavy oceans
- Current updates to computer model

Model

- Current Model Code developed for research/experiments
- General application model is in process
- Provide source code in electronic form
- Update source code to recent model improvement
- Perform code-performance improvement to:
  - Facilitate computing for wide parameter ranges
  - List of physical quantities/data for parameters used
  - Program files for graphic data and print-out options
- Program manual with examples (sample results)
- Exploring linkage to PC Boom 4 Windows based version (ACC funded)